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7. Abstract

Krug, A. D., 1993, Data Validation Report for the 100-NR-1 Operable Unit Task-2 Source Sampling, WHC-SD-EN-TI-190, Rev. 0, prepared by A. T. Kearney, Inc. for Westinghouse Hanford Company, Richland, Washington.

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ACRONYMS

%D	Percent difference
AA	Atomic absorption
BFB	Bromofluorobenzene
BNA	Base/neutral and acid (equivalent to semivolatiles)
CCV	Continuing calibration verification
CLP	Contract Laboratory Program
CRDL	Contract required detection limit
CRQL	Contract required quantitation limit
DBC	Dibutylchloroendate
DFTPP	Decafluorotriphenylphosphine
DQO	Data quality objectives
EPA	U.S. Environmental Protection Agency
GC/MS	Gas chromatography/mass spectrometry
GC	Gas chromatography
GFAA	Graphite furnace atomic absorption
GPC	Gel permeation chromatography
ICP	Inductively coupled plasma emission spectrometry
ICS	ICP interference check sample
ICV	Initial calibration verification
IDL	Instrument detection limit
MSA	Method of standard addition
MS/MSD	Matrix spike/matrix spike duplicate
PCB	Polychlorinated biphenyl
PEM	Performance evaluation mixture
QA	Quality assurance
QC	Quality control
RF	Response factor
RIC	Reconstructed ion chromatogram
RPD	Relative percent difference
RRF	Relative response factor
RRT	Relative retention time
RSD	Relative standard deviation
RT	Retention time
SDG	Sample delivery group
SOW	Statement of work
TAL	Target analyte list
TCL	Target compound list
TIC	Tentatively identified compounds
TOC	Total organic carbon
TOX	Total organic halides
VOC	Volatile organic compounds

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1.0 INTRODUCTION

Analytical results for the following samples from the 100-NR-1 Operable Unit Task-2 Source Sampling event were obtained and validated:

B085H2	B085H7
B085H3	B085H8
B085H4	B085H9
B085H5	B085J0
B085H6	B085J1

The data from the chemical analysis of the ten samples listed above and their related quality assurance samples were reviewed and validated to verify that reported sample results were of sufficient quality to support decisions regarding remedial actions performed at this site. The samples were analyzed by Thermo-Analytic Laboratories (TMA) and Roy F. Weston Laboratories (WESTON) using U.S. Environmental Protection Agency (EPA) protocols and methods.

Sample analyses included:

- Volatile organics
- Semivolatile organics
- Pesticide/PCB organics
- Inorganics
- General chemical parameters.

The table below lists the Sample Delivery Groups (SDGs) validated for this sampling event. The validated data are included in this report.

SDG Package No.	Matrix	No. of Samples Analyzed	Parameters
B085H2	S	9	BNA, Pest/PCB, Inorganics
B085H2	S	3	VOC, Wet Chem
B085H8	S	1	BNA, Pest/PCB, Inorganics

The samples were also analyzed and submitted for validation for radiochemical parameters. Analytical protocols specified in the *Westinghouse Hanford Company Statement of Work for Nonradioactive Inorganic/Organic and Radiochemical Analytical Services* were used. Sample analyses included the following:

- Gross alpha and gross beta determination
- Alpha spectroscopy
- Gamma spectroscopy
- Strontium-90
- Carbon-14.

SDG Package No.	Matrix	No. of Samples Analyzed	Parameters
B085H2	S	9	Radiochemistry
B085H8	S	1	Radiochemistry

The radiochemical data summary tables can be found following Section 11.8.

The data were analyzed by TMA and Roy F. Weston Laboratories. Data quality was reviewed and analytical results validated using Westinghouse-Hanford procedures and related EPA CLP protocols and guidelines. Data were qualified based upon their quality and the guidance provided by these sources. In instances where the two protocols differed, the Westinghouse-Hanford guidance was followed.

One set of split samples were submitted to TMA and Weston. Sample B085H7 was analyzed for BNAs, Pest/PCBs, Inorganics and Radiochemical parameters by TMA. Sample B085H8 was analyzed for the same parameters by Weston. The results for the split samples were compared and RPDs calculated using sample guidelines for determining the RPD between a sample and its duplicate. The precision displayed for the aluminum, vanadium and Uranium-238 results were above the QC limit of 35%. The associated results were qualified as estimates and flagged "J".

A set of field duplicate samples (B085H5 and B085H6) were submitted to TMA for BNA, Pest/PCB, Inorganic and Radiochemical analyses. The RPDs for the results of these analyses were calculated and reviewed using sample guidelines for determining the RPD between a sample and its duplicate. All results fell within the required control limit.

One field blank, sample B085J1, was submitted to TMA for analysis. All results were below acceptable limits and no additional qualification of the data was required.

The report is broken down into sections for each chemical analysis and radiochemical analysis type. Each section addresses the data package completeness, holding time adherence, instrument calibration and tuning acceptability, blank results, accuracy, precision, system performance, as well as the compound identification and quantitation. In addition, each section has an overall assessment and summary for the data packages reviewed for the particular chemical/radiochemical analyses. Detailed backup information is provided to the reader by SDG No. and sample number. For each data package, a matrix of chemical analysis per sample number is presented, as well as data qualification summaries.

Laboratory and data validation personnel added qualifiers to the reported data based on specified data quality objectives. The data reporting qualifiers are summarized as follows:

- U - Indicates the analyte was analyzed for and not detected. The value reported is the sample quantitation limit corrected for dilutions and moisture content. It should be noted that the sample quantitation limit may be higher or lower than the contract or method required detection limit, depending on instrumentation, matrix and concentration factors.
- J - Indicates the analyte was analyzed for and detected. However, the associated value is considered to be an estimate due to identified QC deficiencies. Data flagged with a "J" may be usable for decision making purposes, depending upon the DQOs of the project. Laboratories qualify all reported organic detects below CRQL with a "J" per the CLP procedures.
- UJ - Indicates the analyte was analyzed for and not detected. However, the associated detection limit is considered to be an estimate due to identified QC deficiencies. Detection limits flagged with a "UJ" may be usable for decision making purposes, depending upon the DQOs of the project.
- JN - Indicates the analyte was analyzed for and that there is presumptive evidence of the presence of the compound. The concentration reported is considered an estimate which should be used for informational purposes only.
- E - Indicates the analyte was analyzed for and detected at a concentration outside of the calibration range of the instrument. All reported concentrations flagged with an "E" are estimates which may contain significant error.

R - Indicates the analyte was analyzed for and due to a significant QC deficiency, the data are deemed unusable. Analytic results flagged "R" are invalid and provide no information as to whether or not the analyte is present.

The results of data validation performed for the 100-NR-1 Operable Unit Task-2 Source Sampling Remedial Investigation are contained in the tables following each of the chapters in this report.

Several general quality trends which resulted in data qualification were observed. These included:

- Minor blank contamination was noted in the volatile and semivolatile results for a few samples. The contaminants were compounds commonly found in analytical laboratories and the corresponding sample results were flagged accordingly.
- The holding time from extraction to analysis was exceeded, though not grossly, for both BNA data packages and one Pest/PCB data package. The associated results were flagged accordingly.
- Comparison of quantitation results from the two columns for three pesticide/PCB samples resulted in %Ds above QC limits. The associated analytes were flagged accordingly.
- Surrogate recovery results in two pesticide/PCB samples did not meet QC requirements. All associated results were qualified accordingly.
- The metal analysis showed minor matrix spike accuracy problems, ICP serial dilution RPD results outside of QC and analytical spike recoveries below the QC limit. Approximately 10 percent of the metals results were flagged "J" due to these factors.
- The holding time from sample collection to preparation and analysis was grossly exceeded for phosphate and was slightly exceeded for nitrate-nitrite for all samples in the data package. Associated results were flagged accordingly.
- The matrix spike recovery results for fluoride, phosphate and nitrate-nitrite did not meet QC limits. All associated results were qualified as estimates and flagged "J".
- The laboratory duplicate results for the nitrate-nitrite analyses did not meet QC limits. All associated results were qualified as estimates and flagged "J".
- Due to LCS recoveries outside of QC limits, gross alpha results were flagged "J" in one SDG.

- Due to low chemical yields, the isotopic plutonium results in two samples were rejected and flagged "R".
- Due to high RPDs, all plutonium-239/240 results in one data package were qualified as estimates and flagged "J".
- Minor laboratory blank contamination resulted in Plutonium-239/240 data in one SDG being qualified as estimates.

In general, the protocol-specific QA/QC requirements were met for the samples analyzed in this investigation with the exceptions noted above and discussed in detail in the chapters to follow. All requested analyses were performed.

With the exceptions noted above, the protocol-specific data quality objectives in terms of precision, accuracy, completeness, representativeness, and comparability have been met.

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WELL AND SAMPLE INFORMATION				SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	VOLATILES
116-N-2	B085H2	W	4/07/93	2-5
	B085H3	W	4/07/93	2-5
	B08H54	W	4/07/93	2-5

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2.0 VOLATILE ORGANIC DATA VALIDATION

2.1 DATA PACKAGE COMPLETENESS

Data package (SDG No.) B085H2 was submitted for validation and found to be complete.

2.2 HOLDING TIMES

Analytical holding times were assessed to ascertain whether the Westinghouse-Hanford holding time requirements for volatile organic analyses were met by the laboratory. The Westinghouse-Hanford holding time requirements for volatile organic analyses are as follows: soil samples must be analyzed within 14 days of the date of sample collection; aqueous samples must be analyzed within seven days of the date of sample collection (if unpreserved); and all samples must be shipped on ice to the laboratory and stored at 4°C until analysis.

Holding times were met for all samples.

2.3 INSTRUMENT CALIBRATION AND TUNING

Instrument calibration is performed to establish that the GC/MS instrument is capable of producing acceptable and reliable analytical data over a range of concentrations. The initial and continuing calibrations are to be performed according to CLP protocols. An initial multipoint calibration is performed prior to sample analysis to establish the linear range of the GC/MS instrument. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

All initial and continuing calibration results were acceptable.

2.3.1 GC/MS Tuning/Instrument Performance Check

Tuning is performed to ensure that mass resolution, identification, and, to some degree, sensitivity of the GC/MS instrument have been established. When analyzing for volatile organics, instrument tuning is performed with BFB. Instrument tuning must be performed prior to the analysis of either standards or samples and must meet the criteria for acceptable GC/MS instrument tuning using BFB as outlined in Westinghouse-Hanford (WHC 1991) and in EPA (EPA 1988a and 1988b) criteria.

The original data were checked for transcription and calculation errors to verify that tuning criteria were met. Prior to calibration and sample analysis, all tuning criteria were met.

All GC/MS tuning data were acceptable.

2.4 BLANKS

Method blank and field blank analyses are performed to determine the extent of laboratory or field contamination of samples. No contaminants should be present in the blanks. Analytical results for analytes present in any sample at less than 5 times the concentration of that analyte found in associated blanks should be qualified as non-detects; common laboratory contaminants present at less than 10 times the concentration of that analyte are qualified as non-detects.

Due to the presence of laboratory blank contamination, the following sample was flagged "U" for acetone:

- Sample number B085H3 in SDG No. B085H2.

All other laboratory blank results were acceptable.

2.5 ACCURACY

Accuracy was assessed by evaluating the recoveries of stable isotopically labeled surrogate compounds added to all samples and blanks, and by the analysis of a representative sample which was spiked with a variety of volatile organic compounds.

2.5.1 Matrix Spike Recovery

Matrix spike compounds are added to a sample which is representative of the sample delivery group. Matrix spike analyses are performed in duplicate using five compounds and should be within the established quality control limits (EPA 1988b). The matrix spike analyses estimate how much the target compounds are interfered with, either positively or negatively, by the sample matrix.

All MS/MSD results were acceptable.

2.5.2 Surrogate Recovery

Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. When a surrogate compound recovery is out of the control window, all positively identified target compounds associated with the unacceptable surrogate recoveries are qualified as estimates (J). Undetected

compounds are qualified as having an estimated detection limit (UJ).

All surrogate recovery results were acceptable.

2.6 PRECISION

Precision is expressed by the relative percent difference (RPD) between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. Field precision is measured by analyzing duplicate samples taken in the field.

All matrix spike/matrix spike duplicate RPD results were acceptable.

2.7 INTERNAL STANDARDS PERFORMANCE

Internal standard performance was assessed to determine whether abrupt changes in instrument response and sensitivity occurred that may have affected the reliability of the analytical data. The response (area or height) of the internal standards must not vary by more than 100 percent or -50 percent from the response of the internal standard that was used to calculate the upper and lower bounds. The upper and lower bounds define the range for acceptable internal standard response (area/height) for the sample analyses.

All internal standard recovery results were acceptable.

2.8 COMPOUND IDENTIFICATION AND QUANTITATION

The identity of detected compounds are confirmed to investigate the possibility of false positives. The confirmation of compound identification during the quality assurance review focuses on false positives because only mass spectra for positive identifications are submitted. However, target compounds that are reported as undetected are also evaluated to investigate the possibility of false negatives. Confirmation of possible false negatives is addressed by reviewing other factors relating to analytical sensitivity (e.g., relative response factors, detection limits, linearity, analytical recovery).

Compound quantitations and reported detection limits were recalculated for a minimum of 20 percent of the samples in each case to verify that they are accurate and are consistent with CLP requirements.

Below the CRQL, instrument precision becomes more variable as the instrument detection limit is approached. Therefore, the

concentration of any compound that was detected below the CRQL was qualified as an estimate (J).

The reported results and quantitation limits were verified as correct in all cases.

2.9 OVERALL ASSESSMENT AND SUMMARY

A thorough review of ongoing data acquisition and instrument performance criteria was made to assess overall GC/MS instrument performance. No changes in instrument performance were noted that would result in the degradation of data quality. No indications of unacceptable instrument performance (i.e., shifts in baseline stability, retention time shifts, extraneous peaks, or sensitivity) were found during the quality assurance review.

In general, the volatile data presented in this report met the protocol-specified QA/QC requirements. Minor blank contamination was detected in one sample. The data are considered valid and usable within the standard error associated with the method.

VOLATILE ORGANIC ANALYSIS, SOIL MATRIX, (ug/Kg)

Page_1_ of _1_

Project: WESTINGHOUSE-HANFORD																					
Laboratory: TMA																					
Case		SDG: B085H2																			
Sample Number		B085H2		B085H3		B085H4															
Location		116-N-2		116-N-2		116-N-2															
Remarks																					
Sample Date		04/07/93		04/07/93		04/07/93															
Analysis Date		04/20/93		04/20/93		04/20/93															
Volatile Organic Compound	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Chloromethane	10	11	U	11	U	11	U														
Bromomethane	10	11	U	11	U	11	U														
Vinyl Chloride	10	11	U	11	U	11	U														
Chloroethane	10	11	U	11	U	11	U														
Methylene Chloride	10	11	U	11	U	11	U														
Acetone	10	11	U	11	U	11	U														
Carbon Disulfide	10	11	U	11	U	11	U														
1,1-Dichloroethene	10	11	U	11	U	11	U														
1,1-Dichloroethane	10	11	U	11	U	11	U														
1,2-Dichloroethene (total)	10	11	U	11	U	11	U														
Chloroform	10	11	U	11	U	11	U														
1,2-Dichloroethane	10	11	U	11	U	11	U														
2-Butanone	10	11	U	7	J	11	U														
1,1,1-Trichloroethane	10	11	U	11	U	11	U														
Carbon Tetrachloride	10	11	U	11	U	11	U														
Vinyl Acetate	10	11	U	11	U	11	U														
Bromodichloromethane	10	11	U	11	U	11	U														
1,2-Dichloropropane	10	11	U	11	U	11	U														
cis-1,3-Dichloropropene	10	11	U	11	U	11	U														
Trichloroethene	10	11	U	11	U	11	U														
Dibromochloromethane	10	11	U	11	U	11	U														
1,1,2-Trichloroethane	10	11	U	11	U	11	U														
Benzene	10	11	U	11	U	11	U														
trans-1,3-Dichloropropene	10	11	U	11	U	11	U														
Bromoform	10	11	U	11	U	11	U														
4-Methyl-2-pentanone	10	11	U	11	U	11	U														
2-Hexanone	10	11	U	11	U	11	U														
Tetrachloroethene	10	11	U	11	U	11	U														
1,1,2,2-Tetrachloroethane	10	11	U	11	U	11	U														
Toluene	10	11	U	1	J	11	U														
Chlorobenzene	10	11	U	11	U	11	U														
Ethylbenzene	10	11	U	11	U	11	U														
Styrene	10	11	U	11	U	11	U														
Xylene (total)	10	11	U	11	U	11	U														

BLANK AND SAMPLE DATA SUMMARY

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WELL AND SAMPLE INFORMATION				SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	SEMIVOLATILES
116-N-2	B085H2	W	4/07/93	3-6, 3-7
	B085H3	W	4/07/93	3-6, 3-7
	B08H54	W	4/07/93	3-6, 3-7
1322N	B085H5	W	4/08/93	3-6, 3-7
	B085H6	W	4/08/93	3-6, 3-7
	B085H7	W	4/08/93	3-6, 3-7
	B085H8	W	4/08/93	3-11, 3-12
	B085H9	W	4/08/93	3-6, 3-7
	B085J0	W	4/08/93	3-6, -37
	B085J1	W	4/08/93	3-6, 3-7

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3.0 SEMIVOLATILE ORGANIC DATA VALIDATION

3.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

3.2 HOLDING TIMES

Analytical holding times were assessed to ascertain whether the holding time requirements for semivolatile analyses were met by the laboratory. Westinghouse-Hanford protocols require that samples be extracted within seven days of collection and be analyzed within 40 days of extraction (WHC 1991a).

Based upon Westinghouse-Hanford data validation procedures, the seven-day extraction holding time was exceeded for all samples in both SDGs. The results were flagged "J" and are considered to be estimates.

3.3 INSTRUMENT CALIBRATION AND TUNING

3.3.1 GC/MS Tuning/Instrument Performance Check

Tuning is performed to ensure that mass resolution, and to some degree, sensitivity, of the GC/MS instrument has been established. When analyzing for semi volatile organic compounds, the GC/MS is tuned using DFTPP. The GC/MS must be tuned prior to the analysis of either standards or samples, and tuning must meet the criteria established by the analytical protocol. The specific criteria for acceptable GC/MS tuning using DFTPP are outlined in Westinghouse-Hanford procedures (WHC 1991) and in CLP protocols (EPA 1988a and 1988b).

As part of data validation, the original tuning data were checked for transcription and calculation errors to verify that tuning and performance criteria were met.

All tuning and performance criteria were met.

3.3.2 Initial Calibration

The GC/MS instrument is calibrated to ensure that it is capable of producing acceptable and reliable analytical data over a range of concentrations. The initial and continuing calibrations are to be performed according to CLP protocols. An initial multipoint calibration is performed prior to sample analysis to establish the linearity range of the GC/MS instrument. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Instrument response is established by the initial calibration when the RRFs for all target compounds are greater than or equal to 0.05 units. Linearity is established when the RSDs of the RRFs are less than or equal to 30 percent.

All initial calibration results were acceptable.

3.3.3 Continuing Calibration

The criteria for accepting the continuing calibration require that a standard be analyzed at least once per 12 hour period and that the RRFs of all target compounds be greater than or equal to 0.05 units. In addition, the percent difference of these RRFs must be less than or equal to 25 percent of the average RRFs calculated for the associated initial calibration.

All continuing calibration results were acceptable.

3.4 BLANKS

Method blank and field blank analyses are performed to determine the extent of laboratory or field contamination of samples. No contaminants should be present in the blanks. Analytical results for analytes present in any sample at less than 5 times the concentration of that analyte found in associated blanks should be qualified as non-detects; in the case of certain common laboratory contaminants, results less than 10 times blank concentrations should be qualified as non-detects.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for di-n-butylphthalate:

- Sample numbers B085H2, B085H3, B085H4, B085H5 B085H6, B085H7, B085H9 and B085J0 in SDG No. B085H2.

All other laboratory blank results were acceptable.

3.5 ACCURACY

Accuracy was assessed by evaluating the recoveries of stable isotopically labeled surrogate compounds added to all samples and blanks, and by the analysis of a representative sample which was spiked with a variety of organic compounds.

3.5.1 Matrix Spike Recovery

Matrix spike compounds are added to a sample which is representative of the sample delivery group. Matrix spike analyses are performed in duplicate using the 11 compounds specified by CLP protocols. All recoveries for the 11 compounds should be within the established QC limits (EPA 1988b). The matrix spike analyses estimate how much the analyses for the target compounds are interfered with, either positively or negatively, by the sample matrix. Because the matrix spike is performed using only one of the samples extracted within the SDG, these data alone cannot be used to evaluate the precision and accuracy of individual samples.

All matrix spike/matrix spike duplicate recovery results were acceptable.

3.5.2 Surrogate Recovery

Surrogate compound recoveries are calculated using analytical results from six stable, isotopically labeled surrogate compounds added to the sample prior to sample preparation and analysis. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. When recoveries for any two surrogate compounds are out of the control window, all positively identified target compound concentrations in samples associated with the unacceptable surrogate recoveries are qualified as estimates (J) and undetected compounds are qualified estimated below the detection limit (UJ).

Surrogate recovery results were acceptable for all samples.

3.6 PRECISION

The precision is expressed by the RPD between the recoveries of the matrix spike and the matrix spike duplicate analyses performed on a sample, and through a comparison of the results for field duplicate samples. Acceptable RPD control windows for matrix spike/matrix spike duplicate analyses have been established by the EPA CLP program.

Field precision is measured by analyzing duplicate samples taken in the field. No standards have been established for qualifying data based on RPD for duplicate field samples by CLP

protocols. Westinghouse-Hanford procedures establish the following criteria for duplicate field sample analyses for organic compounds, based on criteria established for inorganic analyses for laboratory duplicates:

1. For compounds whose concentrations are greater than 5 times CRQL, RPDs, must be ± 20 percent for aqueous samples and ± 35 percent for soil samples.
2. When one or more compounds are present at concentrations less than 5 times CRQL, the concentration difference must be \pm CRQL for aqueous samples and \pm CRQL for soil samples.

All matrix spike/matrix spike duplicate RPD results were acceptable for all samples.

3.7 SYSTEM PERFORMANCE

Internal standard performance was assessed to determine whether abrupt changes in instrument response and sensitivity occurred that may have affected the reliability of the analytical data. The response (area or height) of the internal standards must not vary by more than -50 percent or +100 percent from the response of the calibration standard that was used to calculate the upper and lower bounds. The upper and lower bounds define the range for acceptable internal standard response (area/height) for the sample analyses. In addition, retention times for the internal standard must not vary more than ± 30 seconds from that of the associated calibration standard.

All internal standard results were acceptable.

3.8 COMPOUND IDENTIFICATION AND QUANTITATION

The identities of detected compounds were confirmed to investigate the possibility of false positives. The confirmation of compound identification during the QA review focuses on false positives because only mass spectra for positive identifications are submitted. However, target compounds that are reported as undetected are also evaluated to investigate the possibility of false negatives. Confirmation of possible false negatives is addressed by reviewing other factors relating to analytical sensitivity (e.g., detection limits, linearity, analytical recovery). Compound retention times and mass spectra must match those for the standard within set to tolerance limits (EPA 1988b).

3.8.1 Reported Results and Quantitation Limits

Compound quantitations and reported detection limits were recalculated and verified to ensure that they are accurate and

are consistent with the internal standards and relative retention times specified by the CLP scope of work.

At concentrations below the CRQL, instrument precision becomes more variable as the IDL is approached. Therefore, the concentrations of any compound detected below the CRQL are qualified as estimates.

All compound identifications and quantitations have been verified as correct.

3.8.2 Tentatively Identified Compounds

Several TICs were identified in the blanks and samples which were flagged "U" according to Westinghouse-Hanford protocols; if the sample result was ± 0.06 RRT from that of the blank and if the sample result was less than 5 times the highest blank concentration.

3.9 OVERALL ASSESSMENT AND SUMMARY

A thorough review of ongoing data acquisition and instrument performance criteria was made to assess overall GC/MS instrument performance. No changes in instrument performance were noted that would result in the degradation of data quality. No indications of unacceptable instrument performance (i.e., shifts in baseline stability, retention time shifts, extraneous peaks, sensitivity) were found during the quality assurance review.

In general, the semivolatile data presented in this report met the protocol-specified QA/QC requirements. Minor laboratory blank contamination was detected in all field samples in one data package. The sample to extraction holding time was exceeded, though not grossly exceeded, for all BNA samples analyzed. As required by Westinghouse-Hanford protocols, all results for the samples were flagged "J" and are considered to be estimates usable for limited purposes only.

SEMIVOLATILE ORGANIC ANALYSIS, SOIL MATRIX, (ug/Kg)

Project: WESTINGHOUSE-HANFORD																				
Laboratory: TMA																				
Case		SDG: B085H2																		
Sample Number		B085H2		B085H3		B085H4		B085H5		B085H6		B085H7		B085H9		B085J0		B085J1		
Location		116-N-2		116-N-2		116-N-2		1322N		1322N		1322N		1322N		1322N		1322N		
Remarks								DUP		DUP		SPLIT						FB		
Sample Date		04/07/93		04/07/93		04/07/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93		
Extraction Date		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		
Analysis Date		05/06/93		05/07/93		05/07/93		05/07/93		05/07/93		05/07/93		05/07/93		05/07/93		05/06/93		
Semivolatile Compound		CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Phenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
bis(2-Chloroethyl)ether		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2-Chlorophenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
1,3-Dichlorobenzene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
1,4-Dichlorobenzene		330	51	J	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
1,2-Dichlorobenzene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2-Methylphenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,2'-oxybis(1-Chloropropane)		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
4-Methylphenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
N-Nitroso-di-n-propylamine		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Hexachloroethane		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Nitrobenzene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Isophorone		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2-Nitrophenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,4-Dimethylphenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
bis(2-Chloroethoxy)methane		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,4-Dichlorophenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
1,2,4-Trichlorobenzene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Naphthalene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
4-Chloroaniline		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Hexachlorobutadiene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
4-Chloro-3-methylphenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2-Methylnaphthalene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Hexachlorocyclopentadiene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,4,6-Trichlorophenol		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,4,5-Trichlorophenol		1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
2-Chloronaphthalene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2-Nitroaniline		1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
Dimethylphthalate		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	46	J	330	UJ
Acenaphthylene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
3-Nitroaniline		1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
Acenaphthene		330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,4-Dinitrophenol		1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ

FB = Field Blank, DUP = Duplicate

Project: WESTINGHOUSE-HANFORD																			
Laboratory: TMA																			
Case		SDG: B085H2																	
Sample Number		B085H2		B085H3		B085H4		B085H5		B085H6		B085H7		B085H9		B085J0		B085J1	
Location		116-N-2		116-N-2		116-N-2		1322N		1322N		1322N		1322N		1322N		1322N	
Remarks								DUP		DUP		SPLIT						FB	
Sample Date		04/07/93		04/07/93		04/07/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93	
Extraction Date		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93	
Analysis Date		05/06/93		05/07/93		05/07/93		05/07/93		05/07/93		05/07/93		05/07/93		05/07/93		05/06/93	
Semivolatile Compound	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
4-Nitrophenol	1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
Dibenzofuran	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,4-Dinitrotoluene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
2,6-Dinitrotoluene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Diethylphthalate	330	350	UJ	360	UJ	78	J	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
4-Chlorophenyl-phenylether	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Fluorene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
4-Nitroaniline	1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
4,6-Dinitro-2-methylphenol	1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
N-Nitrosodiphenylamine	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
4-Bromophenyl-phenylether	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Hexachlorobenzene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Pentachlorophenol	1700	850	UJ	870	UJ	860	UJ	850	UJ	840	UJ	830	UJ	870	UJ	830	UJ	790	UJ
Phenanthrene	330	350	UJ	150	J	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	95	J	330	UJ
Anthracene	330	350	UJ	38	J	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Carbazole	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Di-n-butylphthalate	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	38	J
Fluoranthene	330	350	UJ	260	J	99	J	350	UJ	350	UJ	340	UJ	360	UJ	99	J	330	UJ
Pyrene	330	350	UJ	320	J	130	J	350	UJ	350	UJ	340	UJ	360	UJ	110	J	330	UJ
Butylbenzylphthalate	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
3,3'-Dichlorobenzidine	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Benzo(a)anthracene	330	350	UJ	140	J	85	J	350	UJ	350	UJ	340	UJ	360	UJ	63	J	330	UJ
bis(2-Ethylhexyl)phthalate	330	350	UJ	360	UJ	360	UJ	36	J	350	UJ	340	UJ	360	UJ	48	J	330	UJ
Chrysene	330	350	UJ	120	J	78	J	350	UJ	350	UJ	340	UJ	360	UJ	62	J	330	UJ
Di-n-octylphthalate	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Benzo(b)fluoranthene	330	350	UJ	120	J	73	J	350	UJ	350	UJ	340	UJ	360	UJ	69	J	330	UJ
Benzo(k)fluoranthene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Benzo(a)pyrene	330	350	UJ	53	J	40	J	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Indeno(1,2,3-cd)pyrene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Dibenzo(a,h)anthracene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ
Benzo(g,h,i)perylene	330	350	UJ	360	UJ	360	UJ	350	UJ	350	UJ	340	UJ	360	UJ	340	UJ	330	UJ

9 3 1 3 0 2 6 0 3 3 3

HOLDING TIME SUMMARY

SDG: B085H2	REVIEWER: SC	DATE: 7/24/93	PAGE <u>1</u> OF <u>1</u>				
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B085H2	BNA	4/7/93	4/21/93	5/6/93	7	40	J
B085H3	BNA	4/7/93	4/21/93	5/7/93	7	40	J
B085H4	BNA	4/7/93	4/21/93	5/7/93	7	40	J
B085H5	BNA	4/8/93	4/21/93	5/7/93	7	40	J
B085H6	BNA	4/8/93	4/21/93	5/7/93	7	40	J
B085H7	BNA	4/8/93	4/21/93	5/7/93	7	40	J
B085H9	BNA	4/8/93	4/21/93	5/7/93	7	40	J
B085J0	BNA	4/8/93	4/21/93	5/7/93	7	40	J
B085J1	BNA	4/8/93	4/21/93	5/6/93	7	40	J

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[illegible]

[illegible]

9 3 1 3 0 2 6 0 8 5 7

SEMIVOLATILE ORGANIC ANALYSIS, SOIL MATRIX, (ug/Kg)

Page 2 of 2

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: B085H8																			
Sample Number		B085H8																			
Location		1322N																			
Remarks		Split																			
Sample Date		4/08/93																			
Extraction Date		4/16/93																			
Analysis Date		4/28/93																			
Semivolatile Compound	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Acenaphthene	330	350	UJ																		
2,4-Dinitrophenol	1700	880	UJ																		
4-Nitrophenol	1700	880	UJ																		
Dibenzofuran	330	350	UJ																		
2,4-Dinitrotoluene	330	350	UJ																		
2,6-Dinitrotoluene	330	350	UJ																		
Diethylphthalate	330	350	UJ																		
4-Chlorophenyl-phenylether	330	350	UJ																		
Fluorene	330	350	UJ																		
4-Nitroaniline	1700	880	UJ																		
4,6-Dinitro-2-methylphenol	1700	880	UJ																		
N-Nitrosodiphenylamine	330	350	UJ																		
4-Bromophenyl-phenylether	330	350	UJ																		
Hexachlorobenzene	330	350	UJ																		
Pentachlorophenol	1700	880	UJ																		
Phenanthrene	330	350	UJ																		
Anthracene	330	350	UJ																		
Carbazole	330	350	UJ																		
Di-n-butylphthalate	330	21	J																		
Fluoranthene	330	350	UJ																		
Pyrene	330	350	UJ																		
Butylbenzylphthalate	330	350	UJ																		
3,3'-Dichlorobenzidine	330	350	UJ																		
Benzo(a)anthracene	330	350	UJ																		
bis(2-Ethylhexyl)phthalate	330	350	UJ																		
Chrysene	330	350	UJ																		
Di-n-octylphthalate	330	350	UJ																		
Benzo(b)fluoranthene	330	350	UJ																		
Benzo(k)fluoranthene	330	350	UJ																		
Benzo(a)pyrene	330	350	UJ																		
Indeno(1,2,3-cd)pyrene	330	350	UJ																		
Dibenzo(a,h)anthracene	330	350	UJ																		
Benzo(g,h,i)perylene	330	350	UJ																		

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WMC-SD-EN-TI-190, Rev. 0

HOLDING TIME SUMMARY

WELL AND SAMPLE INFORMATION				SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	PESTICIDES/PCBs
116-N-2	B085H2	W	4/07/93	4-6
	B085H3	W	4/07/93	4-6
	B08H54	W	4/07/93	4-6
1322N	B085H5	W	4/08/93	4-6
	B085H6	W	4/08/93	4-6
	B085H7	W	4/08/93	4-6
	B085H8	W	4/08/93	4-11
	B085H9	W	4/08/93	4-6
	B085J0	W	4/08/93	4-6
	B085J1	W	4/08/93	4-6

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4.0 PESTICIDE AND PCB DATA VALIDATION

4.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

Due to high concentrations of Aroclor-1254 and resulting poor surrogate recoveries due to interferences, sample numbers B085H5, B085H6, B085H7 and B085H9 in SDG No. B085H2, and B085H8 in SDG No. B085H8 were diluted and reanalyzed with the diluted samples indicated by use of the suffix "DL". After careful review of surrogate recoveries, chromatographic quality, holding times and the absence of other target pesticide or PCB compounds at lower concentrations, it was determined that the original analyses would be reported for samples B085H5, B085H9 and B085H8, and that the diluted analyses would be reported here for B085H6 (B085H6DL) and B085H7 (B085H7DL).

4.2 HOLDING TIMES

Analytical holding times were assessed to ascertain whether the holding time requirements for pesticide/PCB analyses were met by the laboratory. Westinghouse-Hanford procedures require that samples be extracted within seven days of collection and analyzed within 40 days of extraction (WHC 1991a).

Based upon Westinghouse-Hanford data validation procedures, the seven-day extraction holding time was exceeded for all samples in SDG No. B085H2. The results were flagged "J" and are considered to be estimates. However, the sample met the USEPA Data Validation Guidelines, which require a 14-day extraction holding time.

Holding time requirements were met for all other samples.

4.3 INSTRUMENT PERFORMANCE AND CALIBRATIONS

Instrument performance was assessed to ensure that adequate chromatographic resolution and instrument sensitivity were achieved by the gas chromatographic system.

The specific criteria for acceptable instrument performance are outlined in EPA guidelines (EPA 1988a and 1988b), including

the evaluation and qualification procedures that may be performed on the analytical results.

During the quality assurance review, all indicators for acceptable instrument performance were verified. The criteria established by CLP protocols were met and the results are acceptable, except as noted.

Instrument calibration is performed to ensure that the chromatographic system is capable of producing acceptable and reliable analytical data. The initial and continuing calibrations are to be performed according to procedures established by CLP protocols. An initial calibration is performed prior to sample analysis to establish the linear range of the system, including a demonstration that all target compounds can be detected. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

4.3.1 Initial Calibrations

The laboratory performed an initial multipoint calibration for all target compounds at the concentrations required by CLP protocols. The linearity of the initial calibration is established when the percent RSD or the calibration factors are less than or equal to 10 percent (or 15% for certain analytes).

All initial calibration results were acceptable.

4.3.2 Calibration Verification

The criteria for acceptable continuing calibrations requires that the calibration factors for all target compounds have a percent difference of less than or equal to 15 percent of the average calibration factor calculated for the associated initial calibration standard. The 15 percent difference value is required for results calculated using the chromatographic column which is used for quantitative purposes. In addition, the percent difference of the calibration factors calculated for the chromatographic column that is used for confirmation must be less than or equal to 25 percent.

All calibration verification results were acceptable.

4.4 BLANKS

Method blank and field blank analyses are performed to determine the extent of laboratory or field contamination of samples. No contaminants should be present in the blanks. Analytical results for analytes present in any sample at less than 5 times the concentration of that analyte found in associated blanks should be qualified as non-detects.

There were no compounds of concern detected in the method blank.

4.5 ACCURACY

Accuracy was assessed by evaluating the recoveries of the surrogate compounds and the matrix spike recoveries calculated for the sample analyses.

4.5.1 Matrix Spike Recovery

Matrix spike analyses are performed in duplicate using six compounds specified by CLP protocols. The recoveries for the six compounds must be within the acceptable quality control limits established by CLP protocols.

All matrix spike/matrix spike duplicate results were acceptable.

4.5.2 Surrogate Recovery

Surrogate compound recoveries are calculated using analytical results from two stable surrogate compounds added to the sample prior to sample preparation and analysis. Matrix-specific surrogate compound recovery control windows have been established by the EPA CLP program. When recoveries for either surrogate compound are out of the control window, all positively identified target compound concentrations in samples associated with the unacceptable surrogate recoveries are qualified as estimates (J) and undetected compounds are qualified estimated below the detection limit (UJ).

The surrogate recovery for decachlorobiphenyl was above the QC limits for sample number B085H9 in SDG No. B085H2. The high recovery was apparently due to interference from overlapping PCB peaks associated with the Aroclor-1254 detected in the sample. All associated PCB data were qualified as estimates and flagged "J". The surrogate recovery for tetrachloro-m-xylene was slightly below QC limits for sample number B085H7 in SDG No. B085H2. All associated pesticide data were qualified as estimates and flagged "J".

Surrogate recovery results were acceptable for all other samples.

4.6 PRECISION

Precision is expressed by the RPD between the recoveries of the matrix spike and the matrix spike duplicate analyses performed on a sample. When the laboratory has not performed

duplicate spike analyses, precision may also be assessed by using unspiked duplicate analyses.

All matrix spike/matrix spike duplicate RPDs were acceptable.

4.7 COMPOUND IDENTIFICATION AND QUANTITATION

The data were evaluated to confirm the positive concentrations and to investigate the possibility of false negatives in all other data. Confirmation of possible false negatives is addressed by reviewing other factors relating to analytical sensitivity (e.g., detection limits, instrument linearity, analytical recovery). These factors were found to be in control, and the data are acceptable.

The analyte quantitations obtained from the two separate columns used for confirmatory analysis displayed unacceptable accuracy results for certain results. The results listed below had %Ds between 25 and 75%. All associated data were qualified as estimates and flagged "J".

- Aldrin, dieldrin, and 4,4'-DDT in sample number B085J1 in SDG No. B085H2
- Aroclor-1254 in sample number B085H4 in SDG No. B085H2
- Aroclor-1260 in sample number B085H8 in SDG No. B085H8.

The following results displayed %Ds greater than 75%. The analyte results were rejected and flagged "R".

- Gamma-BHC (Lindane) and heptachlor in sample number B085J1 in SDG No. B085H2

All other compound identifications and quantitation results were acceptable.

4.7.1 Reported Quantitation Limits

Compound quantitations and reported detection limits were recalculated and verified for a minimum of 20 percent of the samples in each case to ensure that they were accurate and are consistent with CLP requirements (EPA 1988a). The reported detection limits must be in accordance with the CRQLs specified in the applicable CLP statement of work.

The compound quantitations and the CRQLs reported were calculated correctly and were acceptable.

4.8 OVERALL ASSESSMENT AND SUMMARY

A thorough review of ongoing data acquisition and instrument performance criteria was made to assess overall GC/MS instrument performance. No changes in instrument performance were noted that would result in the degradation of data quality. No indications of unacceptable instrument performance (i.e., shifts in baseline stability, retention time shifts, extraneous peaks, or sensitivity) were found during the quality assurance review.

In general, the pesticide/PCB data presented in this report met the protocol-specified QA/QC requirements. The sample to extraction holding time was exceeded, though not grossly exceeded, for all samples in one data package. As required by Westinghouse-Hanford protocols, all results for the sample were flagged "J" and are considered to be estimates.

The two column results comparison was above the acceptable limits for several analytes in three samples. One sample in SDG No. B085H2 displayed unacceptable results for two pesticide analytes and a second sample for one Aroclor, and one sample in SDG No. B085H8 for one Aroclor. The associated results were flagged "J" and are considered to be estimates. The results for two pesticide analytes in a sample in SDG No. B085H2 grossly exceeded the QC limits and were rejected and flagged "R".

The surrogate recovery results for two samples did not meet QC limits. All associated results were qualified as estimates.

Rejected results are unusable for any purpose. Data qualified as estimates are considered to be estimates usable for limited purposes only. All other data are considered valid and usable within the standard error associated with the method.

Project: WESTINGHOUSE-HANFORD																				
Laboratory: TMA																				
Case		SDG: B085H2																		
Sample Number		B085H2		B085H3		B085H4		B085H5		B085H6DL		B085H7DL		B085H9		B085J0		B085J1		
Location		116-N-2		116-N-2		116-N-2		1322N		1322N		1322N		1322N		1322N		1322N		
Remarks								DUP		DUP, DIL		SPL, DIL						FB		
Sample Date		04/07/93		04/07/93		04/07/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93		
Extraction Date		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		04/21/93		
Analysis Date		05/18/93		05/18/93		05/18/93		05/18/93		05/18/93		05/18/93		05/18/93		05/19/93		05/19/93		
Pesticide/PCB		CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
alpha-BHC		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
beta-BHC		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
delta-BHC		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
gamma-BHC (Lindane)		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	0.24	R
Heptachlor		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	0.24	R
Aldrin		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	0.23	J
Heptachlor epoxide		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
Endosulfan I		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
Dieldrin		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	0.45	J
4,4'-DDE		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	3.3	UJ
Endrin		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	0.60	J
Endosulfan II		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	3.3	UJ
4,4'-DDD		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	3.3	UJ
Endosulfan sulfate		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	3.3	UJ
4,4'-DDT		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	0.54	J
Methoxychlor		17.0	18	UJ	18	UJ	18	UJ	18	UJ	890	UJ	180	UJ	18	UJ	440	UJ	17	UJ
Endrin Ketone		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	3.3	UJ
Endrin Aldehyde		3.3	3.5	UJ	3.6	UJ	3.5	UJ	3.4	UJ	170	UJ	34	UJ	3.5	UJ	85	UJ	3.3	UJ
alpha-Chlordane		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
gamma-Chlordane		1.7	1.8	UJ	1.8	UJ	1.8	UJ	1.8	UJ	89	UJ	18	UJ	1.8	UJ	44	UJ	1.7	UJ
Toxaphene		170.0	180	UJ	180	UJ	180	UJ	180	UJ	8900	UJ	1800	UJ	180	UJ	4400	UJ	170	UJ
Aroclor-1016		33.0	35	UJ	36	UJ	35	UJ	34	UJ	1700	UJ	340	UJ	35	UJ	850	UJ	33	UJ
Aroclor-1221		33.0	71	UJ	72	UJ	72	UJ	70	UJ	3500	UJ	690	UJ	72	UJ	1700	UJ	67	UJ
Aroclor-1232		67.0	35	UJ	36	UJ	35	UJ	34	UJ	1700	UJ	340	UJ	35	UJ	850	UJ	33	UJ
Aroclor-1242		33.0	35	UJ	36	UJ	35	UJ	34	UJ	1700	UJ	340	UJ	35	UJ	850	UJ	33	UJ
Aroclor-1248		33.0	35	UJ	36	UJ	35	UJ	34	UJ	1700	UJ	340	UJ	35	UJ	850	UJ	33	UJ
Aroclor-1254		33.0	35	J	36	UJ	30	J	980	J	1500	J	440	J	3000	J	590	J	33	UJ
Aroclor-1260		33.0	22	J	36	UJ	35	UJ	34	UJ	1700	UJ	340	UJ	35	UJ	850	UJ	33	UJ

DUP = Duplicate, DIL = Dilution, SPL = Split, FB = Field blank

9 3 1 3 0 2 6 0 8 6 7

HOLDING TIME SUMMARY

SDG: B085H2	REVIEWER: SC	DATE: 7/24/93	PAGE <u>1</u> OF <u>1</u>				
COMMENTS:							
FIELD SAMPLE ID	ANALYSIS TYPE	DATE SAMPLED	DATE PREPARED	DATE ANALYZED	PREP. HOLDING TIME, DAYS	ANALYSIS HOLDING TIME, DAYS	QUALIFIER
B085H2	Pest/PCB	4/7/93	4/21/93	5/18/93	7	40	J
B085H3	Pest/PCB	4/7/93	4/21/93	5/18/93	7	40	J
B085H4	Pest/PCB	4/7/93	4/21/93	5/18/93	7	40	J
B085H5	Pest/PCB	4/8/93	4/21/93	5/18/93	7	40	J
B085H6	Pest/PCB	4/8/93	4/21/93	5/18/93	7	40	J
B085H7	Pest/PCB	4/8/93	4/21/93	5/18/93	7	40	J
B085H9	Pest/PCB	4/8/93	4/21/93	5/18/93	7	40	J
B085J0	Pest/PCB	4/8/93	4/21/93	5/19/93	7	40	J
B085J1	Pest/PCB	4/8/93	4/21/93	5/19/93	7	40	J

CALIBRATION DATA SUMMARY

4-8

ACCURACY DATA SUMMARY

[illegible]

DATA QUALIFICATION SUMMARY

[illegible]

PESTICIDE/PCB ORGANIC ANALYSIS, SOIL MATRIX, (ug/Kg)

Page 1 of 1

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: B085H8																			
Sample Number		B085H8																			
Location		1322N																			
Remarks		Split																			
Sample Date		04/08/93																			
Extraction Date		04/14/93																			
Analysis Date		04/30/93																			
Pesticide/PCB	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
alpha-BHC	1.7	1.8	U																		
beta-BHC	1.7	1.8	U																		
delta-BHC	1.7	1.8	U																		
gamma-BHC (Lindane)	1.7	1.8	U																		
Heptachlor	1.7	1.8	U																		
Aldrin	1.7	1.8	U																		
Heptachlor epoxide	1.7	1.8	U																		
Endosulfan I	1.7	1.8	U																		
Dieldrin	3.3	3.5	U																		
4,4'-DDE	3.3	3.5	U																		
Endrin	3.3	3.5	U																		
Endosulfan II	3.3	3.5	U																		
4,4'-DDO	3.3	3.5	U																		
Endosulfan sulfate	3.3	3.5	U																		
4,4'-DDT	3.3	3.5	U																		
Methoxychlor	17.0	18	U																		
Endrin Ketone	3.3	3.5	U																		
Endrin Aldehyde	3.3	3.5	U																		
alpha-Chlordane	1.7	1.8	U																		
gamma-Chlordane	1.7	1.8	U																		
Toxaphene	170.0	180	U																		
Aroclor-1016	33.0	35	U																		
Aroclor-1221	33.0	71	U																		
Aroclor-1232	67.0	35	U																		
Aroclor-1242	33.0	35	U																		
Aroclor-1248	33.0	35	U																		
Aroclor-1254	33.0	460																			
Aroclor-1260	33.0	120	J																		

CALIBRATION DATA SUMMARY

WHC-SD-EN-TI-190, Rev. 0

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WELL AND SAMPLE INFORMATION				SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	INORGANICS
116-N-2	B085H2	W	4/07/93	5-8
	B085H3	W	4/07/93	5-8
	B08H54	W	4/07/93	5-8
1322N	B085H5	W	4/08/93	5-8
	B085H6	W	4/08/93	5-8
	B085H7	W	4/08/93	5-8
	B085H8	W	4/08/93	5-13
	B085H9	W	4/08/93	5-8
	B085J0	W	4/08/93	5-8
	B085J1	W	4/08/93	5-8

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5.0 INORGANIC DATA VALIDATION

5.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

5.2 HOLDING TIMES

Analytical holding times for ICP metals, GFAA metals and CVAA mercury analyses were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: samples must be analyzed within twenty-eight days for mercury, 14 days for cyanide and within six months for all other metals.

All holding time requirements for all analytes in all data packages reviewed were met.

5.3 INSTRUMENT PERFORMANCE AND CALIBRATIONS

Performance of specific instrument quality assurance and quality control procedures, including deficiencies noted during the quality assurance review, are outlined below.

Three calibration standards and a blank were analyzed for arsenic, selenium, thallium, and lead by GFAA. The correlation coefficient of a least squares linear regression met the requirements for calibration in all cases.

Up to five calibration standards and a blank were analyzed for mercury by CVAA. The correlation coefficient of a least squares linear regression met the requirements for calibration.

At least one standard and a blank were analyzed by ICP for all other elements.

The above calibrations were each immediately verified with an ICV standard and a calibration blank. The ICV was prepared from a source independent of the calibration standards, at a mid-calibration range concentration. The ICV percent recovery must fall within the control limits of 90 to 110 percent for metals analyzed by ICP and GFAA, and 80 to 150 percent for

mercury. Calibration linearity near the detection limit was verified with a standard prepared at a concentration near the CRDL.

The ICVs met the recommended control limits in all cases.

The calibrations were subsequently verified at regular intervals using a CCV standard. The control windows for percent recovery of CCV standards are the same as the ICV windows described above.

The CCVs met the recommended control limits in all cases.

5.3.1 ICP Calibration

An ICS was analyzed at the beginning and end of each ICP sample run to verify the laboratory interelement and background correction factors. Results for the ICS solution must fall within the control limit of ± 20 percent of the true value.

A five-fold serial dilution is required for all elements analyzed by ICP. The subsequent concentrations of the reanalysis are compared with the original analysis. If the analyte concentration is sufficiently high (a minimum factor of 50 above the IDL) then the serial dilution must agree within 10% of the original determination after correction for dilution.

The ICS has been analyzed at the proper frequency and all ICSAB solution percent recovery values fell within the control limit.

5.3.2 Atomic Absorption Calibrations

Duplicate injections are required for all GFAA analyses. The duplicate injections establish the precision of the individual analytical determinations. For sample concentrations greater than the CRDL, duplicate injections must agree within ± 50 percent RSD. The GFAA calibration results are further discussed in Section 5.7 of this report.

5.4 BLANKS

Samples with digestate concentrations (in ug/L) of less than five times ($< 5x$) the highest amount found in any of the associated blanks have had their associated values qualified as non-detected (U). Samples with concentrations of greater than five times ($> 5x$) the highest amount found in any of the associated blanks do not require qualification.

Due to the presence of laboratory blank contamination, the following samples were flagged "U" for zinc:

- Sample numbers B085H3, B085H4, B085H5, B085H6, B085H7 and B085H9 in SDG No. B085H2.

All other laboratory blank results were acceptable.

5.5 ACCURACY

5.5.1 Matrix Spike Recovery

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations. Matrix spike recoveries must generally fall within the range of 75 to 155 percent. Samples with a spike recovery of less than 30% and a sample value below the IDL were rejected and flagged "R". All other samples with a spike recovery outside the QC limits are qualified as estimates and flagged "J".

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for antimony in the following samples:

- All samples in SDG No. B085H2.

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for lead in the following samples:

- Sample number B085H8 in SDG No. B085H8.

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for manganese in the following samples:

- All samples in SDG No. B085H2.
- Sample number B085H8 in SDG No. B085H8.

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for mercury in the following samples:

- All samples in SDG No. B085H2.

The matrix spike recovery fell outside the QC limits and the associated results flagged "J" for selenium in the following samples:

- Sample number B085H8 in SDG No. B085H8.

All other matrix spike recovery results were acceptable.

5.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be digested or distilled and analyzed with every group of samples which have been prepared together. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

One liquid LCS was digested and analyzed for each of the cases in this report that contained water samples. The results were compared against the control limit of 80-150% as required by the USEPA CLP SOW 3/90 protocol and found to be acceptable.

All LCSW results were found to be acceptable.

5.6 PRECISION

5.6.1 Laboratory Duplicate Samples

The laboratory duplicate results measures the precision of the method by measuring a second aliquot of the sample that is treated the same way as the original. Samples whose precision fell outside the quality control requirements were flagged as estimates "J".

The laboratory duplicate results fell outside the QC limits and the associated results flagged "J" for lead in the following samples:

- All samples in SDG No. B085H2.

All other laboratory duplicate recovery results were acceptable.

5.6.2 ICP Serial Dilution

The ICP serial dilution is used to determine whether significant physical or chemical interferences exist due to sample matrix. If sample concentration is ≥ 50 times the IDL for an analyte and the %D is outside the control limits the associated data must be qualified as estimates "J".

The ICP serial dilution results fell outside the QC limits and the associated result flagged "J" for barium in the following sample:

- Sample number B085H8 in SDG No. B085H8.

The ICP serial dilution results fell outside the QC limits and the associated result flagged "J" for zinc in the following sample:

- Sample number B085H8 in SDG No. B085H8.

All other ICP serial dilution results were acceptable.

5.7 FURNACE AA QUALITY CONTROL

The post-digestion analytical spike is analyzed to determine the extent of interference in the digestate matrix. When the results of the analytical spike analyses exceeds the control window of 85 to 115 percent recovery and the absorbance of the sample is greater than fifty percent of the analytical spike absorbance, then the sample must be reanalyzed using the MSA. The duplicate injections and the analytical spike recoveries establish the precision and accuracy of the individual GFAA determinations.

5.7.1 Duplicate Injections

Each furnace analysis requires a minimum of two injections (burns), except for full Method of Standard Addition (MSA). For concentrations greater than CRDL, the duplicate injection readings must agree within 50% relative standard deviation (RSD) or coefficient of variation (CV). If these requirements are not met, the analytical sample must be rerun once (i.e., two additional burns). If the readings are then still outside the QC limits, the result is qualified as an estimate and flagged "J".

All duplicate injection quality control requirements were met.

5.7.2 Analytical Spike Recoveries

For all samples whose analytical spike results are outside the 85 to 115 percent control limit, but whose absorbances are less than 50 percent of the analytical spike absorbance, the samples were flagged as estimates "J". In cases where the analytical spike recovery was 0.0 percent, the results were rejected and flagged "R".

The analytical spike recovery fell outside the established QC limits and the associated results flagged "J" for arsenic in the following samples:

- Sample number B085H7 in SDG No. B085H2.
- Sample number B085H8 in SDG No. B085H8.

The analytical spike recovery fell outside the established QC limits and the associated results flagged "J" for selenium in the following samples:

- Sample number B085H9 in SDG No. B085H2.
- Sample number B085H8 in SDG No. B085H8.

All other analytical spike recovery results were acceptable.

5.8 ANALYTE QUANTITATION AND DETECTION LIMITS

Twenty percent of sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors.

The reviewer verified that the results and detection limits fell within the linear range of the instrument.

5.9 OVERALL ASSESSMENT AND SUMMARY

All samples were analyzed and reported under the 1990 CLP protocol (EPA 1990). Several inconsistencies and deviations from the protocol were observed. They are as follows:

A CCV and CCB must be analyzed immediately after the ICV and ICB. ICAP and Mercury do not follow this protocol. For ICAP analysis a CCV and CCB were run after the initial interference checks and CRI. This is incorrect because the ICSEA/AB and CRII are considered analytical samples and according to the CLP protocol a CCV and CCB must be run prior to any analytical samples. For mercury, the CCV and CCB were analyzed for after the first ten samples. Refer to Sections E-11 paragraph 5b and E-15 paragraph 4a of the USEPA CLP SOW 3/90 protocol.

Internal Chains of Custody lacked sufficient information such as interdepartmental transfers, i.e., from the sample custodian to the technician responsible for sample preparation and the dates these transfers took place plus the EPA sample ID number. Without this information Internal Chains of Custody can not be verified as those belonging to samples in this report. Refer to Sections F-5, paragraph 1.5 and F-3, paragraph 1.4 of the USEPA CLP SOW 3/90 protocol.

For samples analyzed by Roy F. Weston, incorrect ICP instrument detection limits (IDL's) are being used to report results down to the IDL. Two sets of IDL's (Form 10) are included in the data package for ICAP analysis, one for instrument IC1 and one for instrument IC3. According to the case narrative addendum, Roy F. Weston states that the highest IDL of the two instruments is used as per Exhibit E, Section V, Item 10 (pg. E-53) of the USEPA Statement of Work for Inorganics

Analysis, Document Number ILM05.0. This is correct only when two instruments are being used to determine sample results within a data package. However, in this data package Roy F. Weston used only one ICP instrument to determine the sample results and therefore it is that instrument's IDL's which should be used to calculate results. According to Form XIV information IC1 is the instrument being used for analysis while the IDL's of IC3 are the ones reported on Forms 1-9. This can effect results flagged "U" or results which may be flagged "U" because of laboratory blank contamination.

All raw data associated with Roy F. Weston has not been labelled with the client (EPA) ID number. Results labelled with only the laboratory sample ID number is insufficient. Refer to Section B-10 of the USEPA CLP SOW 390.

Except as noted in the preceding sections, all other data are usable for all purposes.

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INORGANIC ANALYSIS, SOIL MATRIX, (mg/Kg)

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Project: WESTINGHOUSE-HANFORD																			
Laboratory: TMA																			
Case		SDG: B085H2																	
Sample Number		B085H2		B085H3		B085H4		B085H5		B085H6		B085H7		B085H9		B085J0		B085J1	
Location		116-N-2		116-N-2		116-N-2		1322N		1322N		1322N		1322N		1322N		1322N	
Remarks								DUP		DUP		Split						FB	
Sample Date		04/07/93		04/07/93		04/07/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93		04/08/93	
Inorganic Analytes	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	7040		7250		7740		7170		6200		8050	J	6700		6470		52.6	
Antimony	60	3.9	UJ	3.9	UJ	3.9	UJ	3.8	UJ	3.9	UJ	3.6	UJ	3.9	UJ	3.7	UJ	3.5	UJ
Arsenic	10	2.1		2.1		2.2		2.1		2.3		0.94	J	2.5		2.0		0.46	
Barium	200	61.6		67.4		67.4		63.6		54.9		56.9		58.9		48.0		0.50	
Beryllium	5	0.35		0.43		0.63		0.53		0.34		0.33		0.35		0.33		0.10	U
Cadmium	5	0.37	U	0.37	U	0.37	U	0.36	U	0.37	U	0.34	U	0.37	U	0.35	U	0.33	U
Calcium	5000	4020		3710		5170		5950		4500		6280		5620		5850		11.3	
Chromium	10	15.0		10.5		12.2		13.1		10.9		6.3		12.4		9.5		1.1	U
Cobalt	50	7.8		7.5		9.3		8.5		8.3		14.0		8.3		9.7		0.75	U
Copper	25	12.9		12.1		14.6		16.0		13.2		27.0		14.7		20.5		0.83	U
Iron	100	15800		14900		18300		17400		15600		19700		16300		16700		118	
Lead	3	171	J	16.6	J	7.2	J	15.6	J	15.3	J	7.3	J	8.6	J	15.8	J	0.65	J
Magnesium	5000	3560		3800		4520		4570		3980		7150		4260		5540		11.1	
Manganese	15	275	J	269	J	312	J	297	J	258	J	229	J	273	J	235	J	0.38	J
Mercury	0.2	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	UJ	0.05	J	0.05	UJ	0.05	UJ
Nickel	40	11.3		10.5		12.8		12.1		11.0		18.5		11.5		15.3		1.2	U
Potassium	5000	1710		1600		1720		1180		1100		661		1290		805		36.9	U
Selenium	5	0.73	U	0.73	U	0.65	U	0.71	U	0.70	U	0.70	U	0.72	UJ	0.68	U	0.65	U
Silver	10	0.83	U	0.83	U	0.96		0.81		0.82	U	0.77		0.83	U	0.79	U	0.75	U
Sodium	5000	173		137		174		209		185		828		171		437		16.6	
Thallium	10	0.27	U	0.26	U	0.24	U	0.26	U	0.25	U	0.25	U	0.26	U	0.25	U	0.24	U
Vanadium	50	34.6		30.0		38.0		38.1		32.7		33.2	J	34.2		31.1		0.65	U
Zinc	20	68.8		32.0	U	39.0	U	41.4	U	38.9	U	33.6	U	42.4	U	91.6		0.67	U
Cyanide	10	0.54	U	0.51	U	0.54	U	0.54	U	0.53	U	0.52	U	0.54	U	0.52	U	0.50	U

FB = Field Blank, DUP = Duplicate

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[illegible]

ACCURACY DATA SUMMARY

[illegible]



PRECISION DATA SUMMARY

[illegible]

DATA QUALIFICATION SUMMARY

[illegible]

INORGANIC ANALYSIS, SOIL MATRIX, (mg/kg)

Page 1 of 1

Project: WESTINGHOUSE-HANFORD																					
Laboratory: Roy F. Weston																					
Case		SDG: B085H8																			
Sample Number		B085H8																			
Location		1322N																			
Remarks		Split																			
Sample Date		4/08/93																			
Inorganic Analytes	CRQL	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Aluminum	200	5180	J																		
Antimony	60	10.8																			
Arsenic	10	0.66	J																		
Barium	200	53.1	J																		
Beryllium	5	0.47																			
Cadmium	5	1.06	U																		
Calcium	5000	4930																			
Chromium	10	5.90																			
Cobalt	50	14.8																			
Copper	25	29.8																			
Iron	100	18700																			
Lead	3	6.70	J																		
Magnesium	5000	6700																			
Manganese	15	218	J																		
Mercury	0.2	0.05	U																		
Nickel	40	19.0																			
Potassium	5000	765																			
Selenium	5	0.42	UJ																		
Silver	10	1.90	U																		
Sodium	5000	461																			
Thallium	10	1.06	U																		
Vanadium	50	19.8	J																		
Zinc	20	40.6	J																		
Cyanide	10	1.06	U																		

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ACCURACY DATA SUMMARY

[illegible]

PRECISION DATA SUMMARY

SDG: B085H8	REVIEWER: SC	DATE: 7/25/93	PAGE <u>1</u> OF <u>1</u>		
COMMENTS:					
COMPOUND	SAMPLE ID:	SAMPLE ID:	RPD	SAMPLES AFFECTED	QUALIFIER
Barium	B085H8	B085H8L	12.9	B085H8	J
Zinc	B085H8	B085H8L	29.0	B085H8	J
Aluminum	B085H8	B085H7	43	B085H8	J
Vanadium	B085H8	B085H7	49	B085H8	J

DATA QUALIFICATION SUMMARY

[illegible]

WELL AND SAMPLE INFORMATION				SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	WET CHEMISTRY
116-N-2	B085H2	W	4/07/93	6-4, 6-8
	B085H3	W	4/07/93	6-4, 6-8
	B08H54	W	4/07/93	6-4, 6-8

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6.0 WET CHEMISTRY DATA VALIDATION

6.1 DATA PACKAGE COMPLETENESS

Data package (SDG No.) B085H2 was submitted for validation and found to be complete.

6.2 HOLDING TIMES

Analytical holding times for nitrate-nitrite, fluoride, phosphate and sulfate were assessed to ascertain whether the holding time requirements were met by the laboratory. The holding time requirements are as follows: twenty-eight days for nitrate-nitrite, fluoride and sulfate samples, and 48 hours for phosphate samples under the USEPA SW846 protocols.

The holding time was exceeded for nitrate-nitrite for all samples in SDG No. B085H2. All associated sample results were qualified as estimates and flagged "J".

The holding time was grossly exceeded for phosphate for all samples in SDG No. B085H2. The associated sample results were rejected and flagged "R".

Holding times for all other analytes reviewed met QC requirements.

6.3 CALIBRATIONS

All associated instruments were calibrated using the proper standards and procedures.

6.3.1 Initial Calibration

The following calibration procedures must be conducted:

- At least a blank and three standards were used to establish the ion chromatography, ion selective electrode, spectrophotometer, TOC analyzer and TOX analyzer calibrations prior to sample analysis and the correlation was ≥ 0.995 .
- The titrant normality for alkalinity analysis was checked.

All initial calibration results were acceptable, however, ICV summary forms were not submitted.

6.3.2 Continuing Calibration Verification

All CCV standards must be analyzed with the required frequency or every 50 samples. The percent recoveries must fall within the 90-110% acceptance windows.

All continuing calibration results were acceptable, however, CCV and CCB summary forms were not submitted.

6.4 BLANKS

One laboratory preparation blank is analyzed at a frequency of one every 50 samples. All blank results must fall below the CRQL and if not, all associated data <5 times the amount found in the blank is qualified as non-detected "U".

All laboratory blank results were acceptable.

6.5 ACCURACY

6.5.1 Matrix Spike Recovery

Matrix spike analyses are used to assess the analytical accuracy of the reported data and the effect of the matrix on the ability to accurately quantify sample concentrations.

The matrix spike recovery results were below QC limits for fluoride, phosphate and nitrate-nitrite for all samples in SDG No. B085H2. All associated sample results were qualified as estimates and flagged "J".

All other matrix spike results were acceptable.

6.5.2 Laboratory Control Sample Recovery

The LCS monitors the overall performance of the analysis, including the sample preparation. An LCS should be prepared (e.g., digested or distilled) and analyzed with every group of samples which have been prepared together. The performance criteria for aqueous LCS percent recovery is 80 to 150 percent. The performance criteria for solid LCS samples are established through interlaboratory studies coordinated by a certifying agency (e.g., EPA or an independent commercial supplier).

ICV results obtained from the raw data were used to calculate LCS results. All LCS results were found to be acceptable.

6.6 PRECISION

Analytical duplicate sample analyses are used to measure laboratory precision and sample homogeneity. Field duplicate analyses are used to measure both the laboratory and the field sampling procedure precision.

The laboratory duplicate results did not meet QC limits for nitrate-nitrite for all samples in SDG No. B085H2. The sample results were qualified as estimates and flagged "J".

All other duplicate analyses results were acceptable.

6.7 ANALYTE QUANTITATION AND DETECTION LIMITS

Sample results and reported detection limits were recalculated to ensure that the reported results were accurate. Raw data were examined for anomalies, transcription errors, and reduction errors. In addition, the reviewer verified that the results fell within the linear range of the instrument.

6.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicate that instrument performance was adequate for these analyses. The holding times for nitrate-nitrite exceeded the requirements for all three samples. All associated results were qualified as estimates and flagged "J". The holding times for phosphate in the three samples were grossly exceeded and the associated result was rejected and flagged "R".

The matrix spike results did not meet QC limits for fluoride, phosphate and nitrate-nitrite in all samples. The associated results were qualified as estimates and flagged "J". The laboratory duplicate results for nitrate-nitrite analysis exceeded QC limits for all three samples. All associated results were qualified as estimates and flagged "J".

Rejected data are unusable for any purpose and should not be reported. Estimated data are usable for limited purposes only. All other results are acceptable within the standard error associated with the method and are usable for all purposes.

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WET CHEMISTRY/ANIONS ANALYSIS, SOIL MATRIX, (mg/Kg)

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HOLDING TIME SUMMARY

[illegible]

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ACCURACY DATA SUMMARY

[illegible]

DATA QUALIFICATION SUMMARY

[illegible]

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[illegible]

9-6

[illegible]

ACCURACY DATA SUMMARY

SDG: B085H2	REVIEWER: SC	DATE: 7/24/93	PAGE <u>1</u> OF <u>1</u>	
COMMENTS:				
SAMPLE ID	COMPOUND	% RECOVERY	SAMPLE(S) AFFECTED	QUALIFIER REQUIRED
B085H4S	Nitrate-Nitrite	35.7	All	J

PRECISION DATA SUMMARY

[illegible]

DATA QUALIFICATION SUMMARY

[illegible]

7.0 GROSS ALPHA AND GROSS BETA DETERMINATION DATA VALIDATION

7.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

7.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

7.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the gas proportional counter used for gross alpha and gross beta determination is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination as a function of alpha or beta particle energy, and as a function of the mass of material submitted for counting. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

All calibration results were acceptable.

7.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of alpha or beta emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. Acceptable accuracy of spiked sample data must fall within a range of 80 to 120 percent. If spiked sample results were outside this range, the associated data were qualified as estimates (J/UJ).

Due to LCS recoveries out of specification, all Gross Alpha sample results in SDG No. B085H2 were qualified as estimates and flagged "J".

All other accuracy results were acceptable.

7.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. Replicates with activities greater than five times the LLD and with an RPD less than 35 percent are acceptable. If duplicate activities are both $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects (J) or estimated non-detects (UJ).

All precision results were acceptable.

7.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination.

All blank results were acceptable.

7.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

7.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was adequate for these analyses. Minor accuracy problems were encountered in the Gross Alpha analyses for SDG No. B085H2. All associated results were qualified as estimates and flagged "J". These results are usable for limited purposes only. All other results were acceptable and usable for all purposes.

8.0 ALPHA SPECTROSCOPY DATA VALIDATION

8.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

8.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

8.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the alpha spectroscopy system used is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination for each alpha radionuclide region of interest, and a system resolution assessment as measured by the full-width at half maximum for each peak. Initial calibration was performed for each counting geometry used during the analysis of Westinghouse-Hanford samples. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

All calibration results were acceptable.

8.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of alpha emitting radionuclides. The sample activity as determined by analysis is compared to the known activity to assess accuracy. The acceptable matrix spike or Laboratory Control Sample recovery range is 80 to 120 percent, while that for radiometric yields is 30 to 105%. Spike sample results outside the above ranges resulted in qualification of the associated data as estimates (J/UJ).

Due to low chemical yields, all Isotopic Plutonium results in sample numbers B085H5 and B085H6 in SDG No. B085H2 were rejected and flagged "R".

All other accuracy results were acceptable.

8.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate samples. Replicates with a RPD less than 35 percent are acceptable. If duplicate activities are both $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects (J) or estimated non-detects (UJ).

Due to RPDs out of specification, all Plutonium-239/240 sample results in SDG No. B085H2 were qualified as estimates and flagged "J".

All other precision results were acceptable.

8.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results are due to laboratory reagent, sample container, or detector contamination.

Due to the presence of laboratory blank contamination, the Plutonium-239/240 results for sample numbers B085H2, B085H6 and B085J0 in SDG No. B085H2 were qualified as estimates and flagged "J".

All other blank results were acceptable.

8.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitations and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

8.8 OVERALL ASSESSMENT AND SUMMARY

A complete review of all QC and calibration data indicates that overall system performance is adequate. Low chemical yields for the Plutonium isotope analyses in SDG No. B085H2 resulted in the rejection of the data which was flagged "R". Minor Plutonium-239/240 blank contamination was encountered in SDG. No. B085H2. High RPDs were encountered in SDG No. B085H2 for Plutonium-239/240 analyses. All associated results were qualified as estimates and flagged "J". Rejected results are unusable for all purposes. Data qualified as estimates are valid and usable for limited purposes only. All other data were acceptable and usable for all purposes.

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9.0 GAMMA SPECTROSCOPY DATA VALIDATION

9.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

9.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

9.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the gamma spectroscopy system used is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination for each gamma radionuclide region of interest, and a system resolution assessment as measured by the full-width at half maximum for each peak. Initial calibration was performed for each counting geometry used during the analysis of Westinghouse-Hanford samples. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

All calibration results were acceptable.

9.4 ACCURACY

Accuracy was evaluated by analyzing soil or distilled water samples spiked with known amounts of gamma emitting radionuclides. The sample activity as determined by sample analysis is compared to the known activity to assess accuracy. The acceptable spiked recovery range is 80 to 120 percent. If spiked sample results were outside this range the associated data were qualified as estimates (J/UJ).

All accuracy results were acceptable.

9.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. Replicates with a RPD less than 35 percent are acceptable. If duplicate activities are both $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects (J) or estimated non-detects (UJ).

All precision results were acceptable.

9.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results may be due to laboratory reagent, sample container, or detector contamination.

All blank results were acceptable.

9.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitations and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

9.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was adequate for these analyses. All results are acceptable and usable for all purposes.

10.0 STRONTIUM-90 DETERMINATION DATA VALIDATION

10.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

10.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

10.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the low background counting system used for Strontium-90 determination is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument detection efficiency determination. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

Due to irregularities in sample decay measurements by the detector, the Strontium-90 result for sample number B085H8 in SDG No. B085H8 was qualified as estimated and flagged "J".

All other calibration results were acceptable.

10.4 ACCURACY

All spike recoveries should be within the specified QC range of 80 to 120 percent, while all radiotracred samples should show a radiometric yield or recovery between 30 and 105%. Spiked sample results outside the above ranges resulted in qualification of the associated data as estimated.

All accuracy results were acceptable.

10.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. Replicates with an RPD less than 35 percent are acceptable. If duplicate activities are both $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects (J) or estimated non-detects (UJ).

All precision results were acceptable.

10.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results may be due to laboratory reagent, sample container, or detector contamination.

All blank results were acceptable.

10.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

10.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument continuing calibration information and QC data indicates that instrument performance was adequate for these analyses. Minor decay measurement problems were encountered in SDG No. B085H8. Associated results were qualified as estimates and flagged "J". Data with this qualification are valid and usable for limited purposes only. All other results are acceptable and usable for all purposes.

WELL AND SAMPLE INFORMATION				SAMPLE LOCATION INFORMATION
SAMPLE LOCATION	SAMPLE NUMBER	MATRIX	DATE SAMPLED	RADIOCHEMISTRY
116-N-2	B085H2	W	4/07/93	11-3
	B085H3	W	4/07/93	11-3
	B08H54	W	4/07/93	11-3
1322N	B085H5	W	4/08/93	11-3
	B085H6	W	4/08/93	11-3
	B085H7	W	4/08/93	11-3
	B085H8	W	4/08/93	11-4
	B085H9	W	4/08/93	11-3
	B085J0	W	4/08/93	11-3
	B085J1	W	4/08/93	11-3

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11.0 CARBON-14 DETERMINATION DATA VALIDATION

11.1 DATA PACKAGE COMPLETENESS

The following data packages (SDG Nos.) were submitted for validation and found to be complete:

B085H2

B085H8

11.2 HOLDING TIMES

Holding times are calculated from Chain-of-Custody forms to determine the validity of the results. The maximum holding time for this analysis is six months.

All holding times were acceptable.

11.3 INSTRUMENT CALIBRATION AND PERFORMANCE

Instrument calibration is performed to establish that the low background liquid scintillation counting system used for Carbon-14 determination is capable of producing acceptable and reliable analytical data. The initial calibration was performed according to manufacturer's recommendations and consists of an instrument efficiency determination for each applicable radionuclide. Continuing calibration checks are performed to verify that instrument performance is stable and reproducible on a day-to-day basis.

All calibration results were acceptable.

11.4 ACCURACY

All spike recoveries should be within the specified QC range of 80 to 120 percent, while all radiometric yields should fall within the range of 30 to 105%. Spiked sample results outside the above ranges resulted in qualification of the associated data as estimated (J/UJ).

All accuracy results were acceptable.

11.5 PRECISION

Analytical precision is expressed by the RPD between the recoveries of duplicate matrix spike analyses performed on a sample. When the laboratory has not performed duplicate spike analyses, precision may also be assessed using unspiked duplicate sample analyses. Replicates with a RPD less than 35 percent are acceptable. If duplicate activities are both $<5 \times \text{LLD}$, a control limit of $2 \times \text{LLD}$ is used. If replicate values are both below the LLD, no control limit is applicable. If the RPD is outside the applicable control limit, associated results are qualified as estimated detects (J) or estimated non-detects (UJ).

All precision results were acceptable.

11.6 BLANK SAMPLES

Blank samples are analyzed to determine if positive results may be due to laboratory reagent, sample container, or detector contamination.

All blank results were acceptable.

11.7 ANALYTE QUANTITATION AND REPORTED DETECTION LIMITS

Analyte quantitation and detection limits were recalculated for all samples in each data delivery package to verify their accuracy.

All analyte quantitation and reported detection limits were acceptable.

11.8 OVERALL ASSESSMENT AND SUMMARY

A review of instrument performance and calibration indicates that the overall system performance is adequate. All results are acceptable and usable for all purposes.

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9 3 1 3 0 2 6 0 9 1 7

RADIOCHEMISTRY ANALYSIS, SOIL MATRIX, (pCi/g+-2 standard deviations)

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Project: WESTINGHOUSE-HANFORD																				
Laboratory: Roy F. Weston																				
Case		SDG: B085H8																		
Sample Number		B085H8																		
Location		1322N																		
Remarks		Split																		
Sample Date		04/08/93																		
Analysis Date		05/25/93																		
Radiochemistry Analysis	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q	Result	Q
Gross Alpha	9.7																			
Gross Beta	15																			
Uranium-235	0.0033	U																		
Uranium-238	0.13	J																		
Plutonium-239	0.0007	U																		
Americium-241	0.0006	U																		
Strontium-90	0.099	UJ																		
Carbon-14	0.20	U																		
Beryllium-7	-0.036	U																		
Potassium-40	5.43																			
Manganese-54	-0.013	U																		
Cobalt-58	-0.013	U																		
Iron-59	-0.003	U																		
Cobalt-60	0.252																			
Zinc-65	-0.011	U																		
Zirconium-95	0.018	U																		
Ruthenium-103	0.0044	U																		
Ruthenium-106	0.045	U																		
Iodine-131	0.0083	U																		
Cesium-134	0.015	U																		
Cesium-137	0.111																			
Barium-140	-0.015	U																		
Cerium-141	-0.023	U																		
Cerium-144	-0.014	U																		
Europium-152	-0.018	U																		
Europium-154	-0.012	U																		
Europium-155	-0.062	U																		
Radium-226	0.652																			
Thorium-228	0.347																			
Thorium-234	-0.20	U																		

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